SEQUENCE LISTING

<110> Frisen names Holmberg, Johan

<120> Use of Ephrins and Related Molecules to Regulate Cellular Proliferation

<130> 21882-529 UTIL

<140> 10/698,907

<141> 2003-10-31

<150> US 60/460,488

<151> 2003-04-03

<150> US 10/291,290

<151> 2002-11-08

<150> US 60/393,272

<151> 2002-07-02

<150> US 60/345,206

<151> 2001-11-09

<160> 25

<170> PatentIn version 3.2

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Ala Ala Asp Arg His Ile Val Phe Trp Asn Ser Ser Asn Pro Lys Phe 20 25 30

Arg Glu Glu Asp Tyr Thr Val His Val Gln Leu Asn Asp Tyr Leu Asp
35 40 45

Ile Ile Cys Pro His Tyr Glu Asp Asp Ser Val Ala Asp Ala Ala Met 50 55 60

Glu Arg Tyr Thr Leu Tyr Met Val Glu His Gln Glu Tyr Val Ala Cys 70 75 80

Gln Pro Gln Ser Lys Asp Gln Val Arg Trp Asn Cys Asn Arg Pro Ser 85 90 95

Ala Lys His Gly Pro Glu Lys Leu Ser Val Lys Phe Gln Arg Phe Thr 100 105 110

Pro Phe Ile Leu Gly Lys Glu Phe Lys Glu Gly His Ser Tyr Tyr 115 120 125

Val Thr Val Asn Gly Lys Ile Thr His Asn Pro Gln Ala His Val Asn 145 150 155 160

Pro Gln Glu Lys Arg Leu Gln Ala Asp Asp Pro Glu Val Gln Val Leu 165 170 175

His Ser Ile Gly Tyr Ser Ala Ala Pro Arg Leu Phe Pro Leu Val Trp 180 185 190

Ala Val Leu Leu Leu Pro Leu Leu Leu Gln Ser Gln 195 200 205

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Met Ala Pro Ala Gln Arg Pro Leu Leu Pro Leu Leu Leu Leu Leu 1 10 15

Pro Leu Arg Ala Arg Asn Glu Asp Pro Ala Arg Ala Asn Ala Asp Arg 20 25 30

Tyr Ala Val Tyr Trp Asn Arg Ser Asn Pro Arg Phe Gln Val Ser Ala 35 40 45

Val Gly Asp Gly Gly Gly Tyr Thr Val Glu Val Ser Ile Asn Asp Tyr 50 60

Leu Asp Ile Tyr Cys Pro His Tyr Gly Ala Pro Leu Pro Pro Ala Glu 65 70 75 80

Arg Met Glu Arg Tyr Ile Leu Tyr Met Val Asn Gly Glu Gly His Ala 85 90 95

Ser Cys Asp His Arg Gln Arg Gly Phe Lys Arg Trp Glu Cys Asn Arg 100 105 110

Pro Ala Ala Pro Gly Gly Pro Leu Lys Phe Ser Glu Lys Phe Gln Leu 115 120 125

Phe Thr Pro Phe Ser Leu Gly Phe Glu Phe Arg Pro Gly His Glu Tyr

<210>

²⁰⁹ <211>

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<213> Mus musculus

135 140

130

Tyr Tyr Ile Ser Ala Thr Pro Pro Asn Leu Val Asp Arg Pro Cys Leu 145 150 155 160

Arg Leu Lys Val Tyr Val Arg Pro Thr Asn Glu Thr Leu Tyr Glu Ala 165 170 175

Pro Glu Pro Ile Phe Thr Ser Asn Ser Ser Cys Ser Gly Leu Gly Gly 180 185 190

Cys His Leu Phe Leu Thr Thr Val Pro Val Leu Trp Ser Leu Leu Gly 195 200 205

Ser

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<211> 230 <212> PRT

<213> Mus musculus

<400> 3

Met Ala Ala Pro Leu Leu Leu Leu Leu Leu Val Pro Val Pro 1 5 10 15

Leu Leu Pro Leu Leu Ala Gln Gly Pro Gly Gly Ala Leu Gly Asn Arg 20 25 30

His Ala Val Tyr Trp Asn Ser Ser Asn Gln His Leu Arg Arg Glu Gly 40 45

Tyr Thr Val Gln Val Asn Val Asn Asp Tyr Leu Asp Ile Tyr Cys Pro 50 60

His Tyr Asn Ser Ser Gly Pro Gly Gly Gly Ala Glu Gln Tyr Val Leu 65 70 75 80

Tyr Met Val Asn Leu Ser Gly Tyr Arg Thr Cys Asn Ala Ser Gln Gly 85 90 95

Ser Lys Arg Trp Glu Cys Asn Arg Gln His Ala Ser His Ser Pro Ile 100 105 110

Lys Phe Ser Glu Lys Phe Gln Arg Tyr Ser Ala Phe Ser Leu Gly Tyr 115 120 125

Glu Phe His Ala Gly Gln Glu Tyr Tyr Tyr Ile Ser Thr Pro Thr His 130 135 140 Asn Leu His Trp Lys Cys Leu Arg Met Lys Val Phe Val Cys Cys Ala 145 150 155 160

Ser Thr Ser His Ser Gly Glu Lys Pro Val Pro Thr Leu Pro Gln Phe 165 170 175

Thr Met Gly Pro Asn Val Lys Ile Asn Val Leu Glu Asp Phe Glu Gly 180 185 190

Glu Asn Pro Gln Val Pro Lys Leu Glu Lys Ser Ile Ser Gly Thr Ser 195 200 205

Pro Lys Arg Glu His Leu Pro Leu Ala Val Gly Ile Ala Phe Phe Leu 210 215 220

Met Thr Leu Leu Ala Ser 225 230

<210> 4

<211> 206

<212> PRT

<213> Mus musculus

<400> 4

Met Arg Leu Leu Pro Leu Leu Arg Thr Val Leu Trp Ala Ala Leu Leu 1 5 10 15

Gly Ser Arg Leu Pro Gly Cys Ser Ser Leu Arg His Pro Ile Tyr Trp 20 25 30

Asn Ser Ser Asn Pro Arg Leu Leu Arg Gly Asp Ala Val Glu Leu 35 40 45

Gly Phe Asn Asp Tyr Leu Asp Ile Phe Cys Pro His Tyr Glu Ser Pro 50 60

Gly Pro Pro Glu Gly Pro Glu Thr Phe Ala Leu Tyr Met Val Asp Trp 65 70 75 80

Ser Gly Tyr Glu Ala Cys Thr Ala Glu Gly Ala Asn Ala Phe Gln Arg 85 90 95

Trp Asn Cys Ser Met Pro Phe Ala Pro Phe Ser Pro Val Arg Phe Ser 100 105 110

Glu Lys Ile Gln Arg Tyr Thr Pro Phe Pro Leu Gly Phe Glu Phe Leu 115 120 125

Pro Gly Glu Thr Tyr Tyr Ile Ser Val Pro Thr Pro Glu Ser Pro 130 135 140 Gly Arg Cys Leu Arg Leu Gln Val Ser Val Cys Cys Lys Glu Ser Gly 145 150 155 160 Ser Ser His Glu Ser Ala His Pro Val Gly Ser Pro Gly Glu Ser Gly 165 170 175 Thr Ser Gly Trp Arg Gly Gly His Ala Pro Ser Pro Leu Cys Leu Leu 180 185 190 Leu Leu Leu Leu Pro Ile Leu Arg Leu Leu Arg Val Leu

Met Leu His Val Glu Met Leu Thr Leu Leu Phe Leu Val Leu Trp Met 1 5 10 15

Cys Val Phe Ser Gln Asp Pro Gly Ser Lys Val Val Ala Asp Arg Tyr 20 25 30

Ala Val Tyr Trp Asn Ser Ser Asn Pro Arg Phe Gln Arg Gly Asp Tyr 35 40 45

His Ile Asp Val Cys Ile Asn Asp Tyr Leu Asp Val Phe Cys Pro His $50 \hspace{1cm} 55 \hspace{1cm} 60$

Tyr Glu Asp Ser Val Pro Glu Asp Lys Thr Glu Arg Tyr Val Leu Tyr 65 70 75 80

Met Val Asn Phe Asp Gly Tyr Ser Ala Cys Asp His Thr Ser Lys Gly 85 90 95

Phe Lys Arg Trp Glu Cys Asn Arg Pro His Ser Pro Asn Gly Pro Leu 100 105 110

Lys Phe Ser Glu Lys Phe Gln Leu Phe Thr Pro Phe Ser Leu Gly Phe 115 120 125

Glu Phe Arg Pro Gly Arg Glu Tyr Phe Tyr Ile Ser Ser Ala Ile Pro 130 135 140

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Mus musculus

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Asp Asn Gly Arg Arg Ser Cys Leu Lys Leu Lys Val Phe Val Arg Pro 145 150 155 160

Thr Asn Ser Cys Met Lys Thr Ile Gly Val His Asp Arg Val Phe Asp 165 170 175

Val Asn Asp Lys Val Glu Asn Ser Leu Glu Pro Ala Asp Asp Thr Val 180 185 190

His Glu Ser Ala Glu Pro Ser Arg Gly Glu Asn Ala Ala Gln Thr Pro 195 200 205

Arg Ile Pro Ser Arg Leu Leu Ala Ile Leu Leu Phe Leu Leu Ala Met 210 215 220

Leu Leu Thr Leu 225

<210> 6

<211> 345

<212> PRT

<213> Mus musculus

<400> 6

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Val Val Leu Thr Leu Cys Arg Leu Ala Thr Pro Leu Ala Lys Asn Leu 20 25 30

Glu Pro Val Ser Trp Ser Ser Leu Asn Pro Lys Phe Leu Ser Gly Lys 35 40 45

Gly Leu Val Ile Tyr Pro Lys Ile Gly Asp Lys Leu Asp Ile Ile Cys $50 \hspace{1cm} 55 \hspace{1cm} 60$

Pro Arg Ala Glu Ala Gly Arg Pro Tyr Glu Tyr Tyr Lys Leu Tyr Leu 65 70 75 80

Val Arg Pro Glu Gln Ala Ala Ala Cys Ser Thr Val Leu Asp Pro Asn 85 90 95

Val Leu Val Thr Cys Asn Lys Pro His Gln Glu Ile Arg Phe Thr Ile 100 105 110

Lys Phe Gln Glu Phe Ser Pro Asn Tyr Met Gly Leu Glu Phe Lys Lys 115 120 125

Tyr His Asp Tyr Tyr Ile Thr Ser Thr Ser Asn Gly Ser Leu Glu Gly

135

140

Leu Glu Asn Arg Glu Gly Gly Val Cys Arg Thr Arg Thr Met Lys Ile 145 150 155 160 Val Met Lys Val Gly Gln Asp Pro Asn Ala Val Thr Pro Glu Gln Leu 165 170 175 Thr Thr Ser Arg Pro Ser Lys Glu Ser Asp Asn Thr Val Lys Thr Ala 180 185 190 Thr Gln Ala Pro Gly Arg Gly Ser Gln Gly Asp Ser Asp Gly Lys His 195 200 205 Glu Thr Val Asn Gln Glu Glu Lys Ser Gly Pro Gly Ala Gly Gly 210 215 220 Gly Ser Gly Asp Ser Asp Ser Phe Phe Asn Ser Lys Val Ala Leu Phe 225 230 235 240 Ala Ala Val Gly Ala Gly Cys Val Ile Phe Leu Leu Ile Ile Ile Phe 245 250 255 Leu Thr Val Leu Leu Leu Lys Leu Arg Lys Arg His Arg Lys His Thr 260 265 270 Gln Gln Arg Ala Ala Leu Ser Leu Ser Thr Leu Ala Ser Pro Lys 275 280 285 Gly Gly Ser Gly Thr Ala Gly Thr Glu Pro Ser Asp Ile Ile Ile Pro 290 295 300 Leu Arg Thr Thr Glu Asn Asn Tyr Cys Pro His Tyr Glu Lys Val Ser 305 310 315 320 Gly Asp Tyr Gly His Pro Val Tyr Ile Val Gln Glu Met Pro Pro Gln 325 330 335

<210> 7

<211> 336 <212> PRT

<213> Mus musculus

Ser Pro Ala Asn Ile Tyr Tyr Lys Val 340 345

<400> 7

Met Ala Met Ala Arg Ser Arg Arg Asp Ser Val Trp Lys Tyr Cys Trp $10 \quad - \quad 15$

Gly Leu Leu Met Val Leu Cys Arg Thr Ala Ile Ser Arg Ser Ile Val 20 25 30 Leu Glu Pro Ile Tyr Trp Asn Ser Ser Asn Ser Lys Phe Leu Pro Gly 35 40 45 Gln Gly Leu Val Leu Tyr Pro Gln Ile Gly Asp Lys Leu Asp Ile Ile 50 60 Cys Pro Lys Val Asp Ser Lys Thr Val Gly Gln Tyr Glu Tyr Tyr Lys
75 75 80 Val Tyr Met Val Asp Lys Asp Gln Ala Asp Arg Cys Thr Ile Lys Lys 85 90 95 Glu Asn Thr Pro Leu Leu Asn Cys Ala Arg Pro Asp Gln Asp Val Lys $100 \hspace{1cm} 105 \hspace{1cm} 110$ Phe Thr Ile Lys Phe Gln Glu Phe Ser Pro Asn Leu Trp Gly Leu Glu 115 120 125 Phe Gln Lys Asn Lys Asp Tyr Tyr Ile Ile Ser Thr Ser Asn Gly Ser 130 135 140 Leu Glu Gly Leu Asp Asn Gln Glu Gly Gly Val Cys Gln Thr Arg Ala 145 150 155 160 Met Lys Ile Leu Met Lys Val Gly Gln Asp Ala Ser Ser Ala Gly Ser 165 170 175 Ala Arg Asn His Gly Pro Thr Arg Arg Pro Glu Leu Glu Ala Gly Thr 180 185 190 Asn Gly Arg Ser Ser Thr Thr Ser Pro Phe Val Lys Pro Asn Pro Gly 200 205 Ser Ser Thr Asp Gly Asn Ser Ala Gly His Ser Gly Asn Asn Leu Leu 210 215 220 Gly Ser Glu Val Ala Leu Phe Ala Gly Ile Ala Ser Gly Cys Ile Ile 225 230 235 240 Phe Ile Val Ile Ile Ile Thr Leu Val Val Leu Leu Leu Lys Tyr Arg 245 250 255 Arg Arg His Arg Lys His Ser Pro Gln His Thr Thr Leu Ser Leu 260 265 270 Ser Thr Leu Ala Thr Pro Lys Arg Gly Gly Asn Asn Asn Gly Ser Glu 275 280 285

Pro Ser Asp Val Ile Ile Pro Leu Arg Thr Ala Asp Ser Val Phe Cys 290 295 300

Pro His Tyr Glu Lys Val Ser Gly Asp Tyr Gly His Pro Val Tyr Ile 305 310 315 320

Val Gln Glu Met Pro Pro Gln Ser Pro Ala Asn Ile Tyr Tyr Lys Val 325 330 335

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Met Gly Ala Pro His Phe Gly Pro Gly Gly Val Gln Val Gly Ala Leu 1 5 10 15

Leu Leu Gly Phe Ala Gly Leu Val Ser Gly Leu Ser Leu Glu Pro 20 25 30

Val Tyr Trp Asn Ser Ala Asn Lys Arg Phe Gln Ala Glu Gly Gly Tyr 35 40 45

Val Leu Tyr Pro Gln Ile Gly Asp Arg Leu Asp Leu Leu Cys Pro Arg 50 60

Ala Arg Pro Pro Gly Pro His Ser Ser Pro Ser Tyr Glu Phe Tyr Lys 70 75 80

Leu Tyr Leu Val Glu Gly Ala Gln Gly Arg Arg Cys Glu Ala Pro Pro 85 90 95

Ala Pro Asn Leu Leu Leu Thr Cys Asp Arg Pro Asp Leu Asp Leu Arg $100 \hspace{1cm} 105 \hspace{1cm} 110$

Phe Thr Ile Lys Phe Gln Glu Tyr Ser Pro Asn Leu Trp Gly His Glu 115 120 125

Phe Arg Ser His His Asp Tyr Tyr Ile Ile Ala Thr Ser Asp Gly Thr 130 135 140

Arg Glu Gly Leu Glu Ser Leu Gln Gly Gly Val Cys Leu Thr Arg Gly 145 150 155 160

<210> 8

<211> 340

<212> PRT

<213> Mus musculus

Met Lys Val Leu Leu Arg Val Gly Gln Ser Pro Arg Gly Gly Ala Val 165 170 175

Pro Arg Lys Pro Val Ser Glu Met Pro Met Glu Arg Asp Arg Gly Ala 180 185 190

Ala His Ser Ala Glu Pro Gly Arg Asp Thr Ile Pro Gly Asp Pro Ser 195 200 205

Ser Asn Ala Thr Ser Arg Gly Ala Glu Gly Pro Leu Pro Pro Pro Ser 210 215 220

Met Pro Ala Val Ala Gly Ala Ala Gly Gly Met Ala Leu Leu Leu 225 230 235 240

Gly Val Ala Gly Ala Gly Gly Ala Met Cys Trp Arg Arg Arg Ala 245 250 255

Lys Pro Ser Glu Ser Arg His Pro Gly Pro Gly Ser Phe Gly Arg Gly 260 265 270

Gly Ser Leu Gly Leu Gly Gly Gly Gly Met Gly Pro Arg Glu Ala 275 280 285

Glu Pro Gly Glu Leu Gly Ile Ala Leu Arg Gly Gly Gly Thr Ala Asp 290 295 300

Pro Pro Phe Cys Pro His Tyr Glu Lys Val Ser Gly Asp Tyr Gly His 305 310 315 320

Pro Val Tyr Ile Val Gln Asp Gly Pro Pro Gln Ser Pro Pro Asn Ile 325 335

Tyr Tyr Lys Val 340

<210> 9

<211> 205

<212> PRT

<213> Homo sapiens

<400> 9

Met Glu Phe Leu Trp Ala Pro Leu Leu Gly Leu Cys Cys Ser Leu Ala 1 5 10 15

Ala Ala Asp Arg His Thr Val Phe Trp Asn Ser Ser Asn Pro Lys Phe 20 25 30

Arg Asn Glu Asp Tyr Thr Ile His Val Gln Leu Asn Asp Tyr Val Asp 35 40 45

Ile Ile Cys Pro His Tyr Glu Asp His Ser Val Ala Asp Ala Ala Met 50 60

Glu Gln Tyr Ile Leu Tyr Leu Val Glu His Glu Glu Tyr Gln Leu Cys 65 70 75 80

Gln Pro Gln Ser Lys Asp Gln Val Arg Trp Gln Cys Asn Arg Pro Ser 85 90 95

Ala Lys His Gly Pro Glu Lys Leu Ser Glu Lys Phe Gln Arg Phe Thr $100 \hspace{1cm} 105 \hspace{1cm} 110$

Pro Phe Thr Leu Gly Lys Glu Phe Lys Glu Gly His Ser Tyr Tyr 115 120 125

Ile Ser Lys Pro Ile His Gln His Glu Asp Arg Cys Leu Arg Leu Lys 130 140

Val Thr Val Ser Gly Lys Ile Thr His Ser Pro Gln Ala His Val Asn 145 150 155 160

Pro Gln Glu Lys Arg Leu Ala Ala Asp Asp Pro Glu Val Arg Val Leu 165 170 175

His Ser Ile Gly His Ser Ala Ala Pro Arg Leu Phe Pro Leu Ala Trp $180 \hspace{1cm} 185 \hspace{1cm} 190$

Thr Val Leu Leu Leu Pro Leu Leu Leu Gln Thr Pro 195 200 205

Met Ala Pro Ala Gln Arg Pro Leu Leu Pro Leu Leu Leu Leu Leu 1 10 15

Pro Leu Pro Pro Pro Phe Ala Arg Ala Glu Asp Ala Ala Arg Ala 20 25 30

Asn Ser Asp Arg Tyr Ala Val Tyr Trp Asn Arg Ser Asn Pro Arg Phe

His Ala Gly Ala Gly Asp Asp Gly Gly Gly Tyr Thr Val Glu Val Ser 11

<210> 10

<211> 213

<212> PRT

<213> Homo sapiens

<400> 10

Ile Asn Asp Tyr Leu Asp Ile Tyr Cys Pro His Tyr Gly Ala Pro Leu 65 70 75 80

Pro Pro Ala Glu Arg Met Glu His Tyr Val Leu Tyr Met Val Asn Gly 85 90 95

Glu Gly His Ala Ser Cys Asp His Arg Gln Arg Gly Phe Lys Arg Trp 100 105 110

Glu Cys Asn Arg Pro Ala Ala Pro Gly Gly Pro Leu Lys Phe Ser Glu 115 120 125

Lys Phe Gln Leu Phe Thr Pro Phe Ser Leu Gly Phe Glu Phe Arg Pro 130 135 140

Gly His Glu Tyr Tyr Tyr Ile Ser Ala Thr Pro Pro Asn Ala Val Asp 145 150 155 160

Arg Pro Cys Leu Arg Leu Lys Val Tyr Val Arg Pro Thr Asn Glu Thr 165 170 175

Leu Tyr Glu Ala Pro Glu Pro Ile Phe Thr Ser Asn Asn Ser Cys Ser 180 185 190

Ser Pro Gly Gly Cys Arg Leu Phe Leu Ser Thr Ile Pro Val Leu Trp 195 200 205

Thr Leu Leu Gly Ser 210

<210> 11

<211> 238

<212> PRT

<213> Homo sapiens

<400> 11

Met Ala Ala Pro Leu Leu Leu Leu Leu Leu Val Pro Val Pro 10 15

Leu Leu Pro Leu Leu Ala Gln Gly Pro Gly Gly Ala Leu Gly Asn Arg 20 25 30

His Ala Val Tyr Trp Asn Ser Ser Asn Gln His Leu Arg Arg Glu Gly 35 40 45

Tyr Thr Val Gln Val Asn Val Asn Asp Tyr Leu Asp Ile Tyr Cys Pro
50 55 60

His Tyr Asn Ser Ser Gly Val Gly Pro Gly Ala Gly Pro Gly Pro Gly 65 70 75 80

Gly Gly Ala Glu Gln Tyr Val Leu Tyr Met Val Ser Arg Asn Gly Tyr 85 90 95

Arg Thr Cys Asn Ala Ser Gln Gly Phe Lys Arg Trp Glu Cys Asn Arg 100 105 110

Pro His Ala Pro His Ser Pro Ile Lys Phe Ser Glu Lys Phe Gln Arg 115 120 125

Tyr Ser Ala Phe Ser Leu Gly Tyr Glu Phe His Ala Gly His Glu Tyr 130 135 140

Tyr Tyr Ile Ser Thr Pro Thr His Asn Leu His Trp Lys Cys Leu Arg 145 150 155 160

Met Lys Val Phe Val Cys Cys Ala Ser Thr Ser His Ser Gly Glu Lys 165 170 175

Pro Val Pro Thr Leu Pro Gln Phe Thr Met Gly Pro Asn Val Lys Ile 180 185 190

Asn Val Leu Glu Asp Phe Glu Gly Glu Asn Pro Gln Val Pro Lys Leu 195 200 205

Glu Lys Ser Ile Ser Gly Thr Ser Pro Lys Arg Glu His Leu Pro Leu 210 220

Ala Val Gly Ile Ala Phe Phe Leu Met Thr Phe Leu Ala Ser 225 230 235

<400> 12

Met Arg Leu Leu Pro Leu Leu Arg Thr Val Leu Trp Ala Ala Phe Leu $1 \hspace{1cm} 10 \hspace{1cm} 15$

Gly Ser Pro Leu Arg Gly Gly Ser Ser Leu Arg His Val Val Tyr Trp $20 \hspace{1cm} 25 \hspace{1cm} 30$

Asn Ser Ser Asn Pro Arg Leu Leu Arg Gly Asp Ala Val Glu Leu 35 40 45

<210> 12

<211> 201

<212> PRT

<213> Homo sapiens

Gly Leu Asn Asp Tyr Leu Asp Ile Val Cys Pro His Tyr Glu Gly Pro 50 60

Gly Pro Pro Glu Gly Pro Glu Thr Phe Ala Leu Tyr Met Val Asp Trp 65 70 75 80

Pro Gly Tyr Glu Ser Cys Gln Ala Glu Gly Pro Arg Ala Tyr Lys Arg 85 90 95

Trp Val Cys Ser Leu Pro Phe Gly His Val Gln Phe Ser Glu Lys Ile $100 \hspace{1cm} 105 \hspace{1cm} 110$

Gln Arg Phe Thr Pro Phe Ser Leu Gly Phe Glu Phe Leu Pro Gly Glu 115 120 125

Thr Tyr Tyr Tyr Ile Ser Val Pro Thr Pro Glu Ser Ser Gly Gln Cys 130 140

Leu Arg Leu Gln Val Ser Val Cys Cys Lys Glu Arg Lys Ser Glu Ser 145 150 155 160

Ala His Pro Val Gly Ser Pro Gly Glu Ser Gly Thr Ser Gly Trp Arg 165 170 175

Gly Gly Asp Thr Pro Ser Pro Leu Cys Leu Leu Leu Leu Leu Leu Leu 180 185 190

Leu Ile Leu Arg Leu Leu Arg Ile Leu 195 200

<400> 13

Met Leu His Val Glu Met Leu Thr Leu Val Phe Leu Val Leu Trp Met 1 5 10 15

Cys Val Phe Ser Gln Asp Pro Gly Ser Lys Ala Val Ala Asp Arg Tyr 20 25 30

Ala Val Tyr Trp Asn Ser Ser Asn Pro Arg Phe Gln Arg Gly Asp Tyr 35 40 45

His Ile Asp Val Cys Ile Asn Asp Tyr Leu Asp Val Phe Cys Pro His 50 55 60

<210> 13

<211> 228

<212> PRT

<213> Homo sapiens

Tyr Glu Asp Ser Val Pro Glu Asp Lys Thr Glu Arg Tyr Val Leu Tyr 65 70 75 80

Met Val Asn Phe Asp Gly Tyr Ser Ala Cys Asp His Thr Ser Lys Gly 85 90 95

Phe Lys Arg Trp Glu Cys Asn Arg Pro His Ser Pro Asn Gly Pro Leu 100 105 110

Lys Phe Ser Glu Lys Phe Gln Leu Phe Thr Pro Phe Ser Leu Gly Phe 115 120 125

Glu Phe Arg Pro Gly Arg Glu Tyr Phe Tyr Ile Ser Ser Ala Ile Pro 130 135 140

Asp Asn Gly Arg Arg Ser Cys Leu Lys Leu Lys Val Phe Val Arg Pro 145 150 155 160

Thr Asn Ser Cys Met Lys Thr Ile Gly Val His Asp Arg Val Phe Asp 165 170 175

Val Asn Asp Lys Val Glu Asn Ser Leu Glu Pro Ala Asp Asp Thr Val 180 185 190

His Glu Ser Ala Glu Pro Ser Arg Gly Glu Asn Ala Ala Gln Thr Pro 195 200 205

Arg Ile Pro Ser Arg Leu Leu Ala Ile Leu Leu Phe Leu Leu Ala Met 210 220

Leu Leu Thr Leu 225

<210>

<211> 346

<212> PRT

<213> Homo sapiens

<400>

Met Ala Arg Pro Gly Gln Arg Trp Leu Gly Lys Trp Leu Val Ala Met 1 5 10 15

Val Val Trp Ala Leu Cys Arg Leu Ala Thr Pro Leu Ala Lys Asn Leu 20 25 30

Glu Pro Val Ser Trp Ser Ser Leu Asn Pro Lys Phe Leu Ser Gly Lys 35 40 45

Gly Leu Val Ile Tyr Pro Lys Ile Gly Asp Lys Leu Asp Ile Ile Cys
15

55

Pro Arg Ala Glu Ala Gly Arg Pro Tyr Glu Tyr Tyr Lys Leu Tyr Leu 65 70 75 80 Val Arg Pro Glu Gln Ala Ala Ala Cys Ser Thr Val Leu Asp Pro Asn 85 90 95 Val Leu Val Thr Cys Asn Arg Pro Glu Gln Glu Ile Arg Phe Thr Ile 100 105 110 Lys Phe Gln Glu Phe Ser Pro Asn Tyr Met Gly Leu Glu Phe Lys Lys 125 His His Asp Tyr Tyr Ile Thr Ser Thr Ser Asn Gly Ser Leu Glu Gly 130 135 140 Leu Glu Asn Arg Glu Gly Gly Val Cys Arg Thr Arg Thr Met Lys Ile 145 150 155 160 Ile Met Lys Val Gly Gln Asp Pro Asn Ala Val Thr Pro Glu Gln Leu 165 170 175 Thr Thr Ser Arg Pro Ser Lys Glu Ala Asp Asn Thr Val Lys Met Ala 180 185 190 Thr Gln Ala Pro Gly Ser Arg Gly Ser Leu Gly Asp Ser Asp Gly Lys 200 205 His Glu Thr Val Asn Gln Glu Glu Lys Ser Gly Pro Gly Ala Ser Gly 210 215 220 Gly Ser Ser Gly Asp Pro Asp Gly Phe Phe Asn Ser Lys Val Ala Leu 225 230 235 240 Phe Ala Ala Val Gly Ala Gly Cys Val Ile Phe Leu Leu Ile Ile Ile 245 250 255 Phe Leu Thr Val Leu Leu Leu Lys Leu Arg Lys Arg His Arg Lys His 260 265 270 Thr Gln Gln Arg Ala Ala Ala Leu Ser Leu Ser Thr Leu Ala Ser Pro 275 280 285 Lys Gly Gly Ser Gly Thr Ala Gly Thr Glu Pro Ser Asp Ile Ile Ile 290 295 300 Pro Leu Arg Thr Thr Glu Asn Asn Tyr Cys Pro His Tyr Glu Lys Val

320

Ser Gly Asp Tyr Gly His Pro Val Tyr Ile Val Gln Glu Met Pro Pro 325 330 335

Gln Ser Pro Ala Asn Ile Tyr Tyr Lys Val 340 345

310

<210>

15 333 <211>

<212> PRT <213> Homo sapiens

<400> 15

Met Ala Val Arg Arg Asp Ser Val Trp Lys Tyr Cys Trp Gly Val Leu 1 10 15

Met Val Leu Cys Arg Thr Ala Ile Ser Lys Ser Ile Val Leu Glu Pro 20 25 30

Ile Tyr Trp Asn Ser Ser Asn Ser Lys Phe Leu Pro Gly Gln Gly Leu 35 40 45

Val Leu Tyr Pro Gln Ile Gly Asp Lys Leu Asp Ile Ile Cys Pro Lys 50 60

Val Asp Ser Lys Thr Val Gly Gln Tyr Glu Tyr Tyr Lys Val Tyr Met 65 70 75 80

Val Asp Lys Asp Gln Ala Asp Arg Cys Thr Ile Lys Lys Glu Asn Thr 85 90 95

Pro Leu Leu Asn Cys Ala Lys Pro Asp Gln Asp Ile Lys Phe Thr Ile 100 105 110

Lys Phe Gln Glu Phe Ser Pro Asn Leu Trp Gly Leu Glu Phe Gln Lys

Asn Lys Asp Tyr Tyr Ile Ile Ser Thr Ser Asn Gly Ser Leu Glu Gly 130 135 140

Leu Asp Asn Gln Glu Gly Gly Val Cys Gln Thr Arg Ala Met Lys Ile 145 150 155 160

Leu Met Lys Val Gly Gln Asp Ala Ser Ser Ala Gly Ser Thr Arg Asn 165 170 175

Lys Asp Pro Thr Arg Arg Pro Glu Leu Glu Ala Gly Thr Asn Gly Arg 185

Ser Ser Thr Thr Ser Pro Phe Val Lys Pro Asn Pro Gly Ser Ser Thr 195 200 205

Asp Gly Asn Ser Ala Gly His Ser Gly Asn Asn Ile Leu Gly Ser Glu 210 215 220

Val Ala Leu Phe Ala Gly Ile Ala Ser Gly Cys Ile Ile Phe Ile Val 225 230 235 240

Ile Ile Ile Thr Leu Val Val Leu Leu Leu Lys Tyr Arg Arg Arg His 245 250 255

Arg Lys His Ser Pro Gln His Thr Thr Leu Ser Leu Ser Thr Leu 260 265 270

Ala Thr Pro Lys Arg Ser Gly Asn Asn Gly Ser Glu Pro Ser Asp 275 280 285

Ile Ile Ile Pro Leu Arg Thr Ala Asp Ser Val Phe Cys Pro His Tyr 290 295 300

Glu Lys Val Ser Gly Asp Tyr Gly His Pro Val Tyr Ile Val Gln Glu 305 310 315 320

Met Pro Pro Gln Ser Pro Ala Asn Ile Tyr Tyr Lys Val 325 330

<400> 16

Met Gly Pro Pro His Ser Gly Pro Gly Gly Val Arg Val Gly Ala Leu $1 \hspace{1cm} 5 \hspace{1cm} 10 \hspace{1cm} 15$

Leu Leu Gly Val Leu Gly Leu Val Ser Gly Leu Ser Leu Glu Pro 20 25 30

Val Tyr Trp Asn Ser Ala Asn Lys Arg Phe Gln Ala Glu Gly Gly Tyr 35 40 45

Val Leu Tyr Pro Gln Ile Gly Asp Arg Leu Asp Leu Leu Cys Pro Arg 50 60

Ala Arg Pro Pro Gly Pro His Ser Ser Pro Asn Tyr Glu Phe Tyr Lys 70 75 80

<210> 16

<211> 340

<212> PRT

<213> Homo sapiens

Leu Tyr Leu Val Gly Gly Ala Gln Gly Arg Arg Cys Glu Ala Pro Pro 85 90 95 Ala Pro Asn Leu Leu Leu Thr Cys Asp Arg Pro Asp Leu Asp Leu Arg $100 \hspace{1cm} 105 \hspace{1cm} 110$ Phe Thr Ile Lys Phe Gln Glu Tyr Ser Pro Asn Leu Trp Gly His Glu 115 120 125 Phe Arg Ser His His Asp Tyr Tyr Ile Ile Ala Thr Ser Asp Gly Thr 130 135 140 Arg Glu Gly Leu Glu Ser Leu Gln Gly Gly Val Cys Leu Thr Arg Gly 145 150 155 160 Met Lys Val Leu Leu Arg Val Gly Gln Ser Pro Arg Gly Gly Ala Val 165 170 175 Pro Arg Lys Pro Val Ser Glu Met Pro Met Glu Arg Asp Arg Gly Ala 180 185 190 Ala His Ser Leu Glu Pro Gly Lys Glu Asn Leu Pro Gly Asp Pro Thr 195 200 205 Ser Asn Ala Thr Ser Arg Gly Ala Glu Gly Pro Leu Pro Pro Pro Ser 210 215 220 Met Pro Ala Val Ala Gly Ala Ala Gly Gly Leu Ala Leu Leu Leu 225 230 235 240 Gly Val Ala Gly Ala Gly Gly Ala Met Cys Trp Arg Arg Arg Ala 245 250 255 Lys Pro Ser Glu Ser Arg His Pro Gly Pro Gly Ser Phe Gly Arg Gly 260 265 270 Gly Ser Leu Gly Leu Gly Gly Gly Gly Met Gly Pro Arg Glu Ala 275 280 285 Glu Pro Gly Glu Leu Gly Ile Ala Leu Arg Gly Gly Gly Ala Ala Asp 290 295 300 Pro Pro Phe Cys Pro His Tyr Glu Lys Val Ser Gly Asp Tyr Gly His 305 310 315 320Pro Val Tyr Ile Val Gln Asp Gly Pro Pro Gln Ser Pro Pro Asn Ile 325 330 335 Tyr Tyr Lys Val

<210> 17

417 <211>

<212> **PRT** Artificial <213>

<220>

GST-EphA7-LBD fusion protein <223>

<400>

Met Ser Pro Ile Leu Gly Tyr Trp Lys Ile Lys Gly Leu Val Gln Pro 1 5 10 15

Thr Arg Leu Leu Glu Tyr Leu Glu Glu Lys Tyr Glu Glu His Leu 20 25 30

Tyr Glu Arg Asp Glu Gly Asp Lys Trp Arg Asn Lys Lys Phe Glu Leu 35 40 45

Gly Leu Glu Phe Pro Asn Leu Pro Tyr Tyr Ile Asp Gly Asp Val Lys 50 60

Leu Thr Gln Ser Met Ala Ile Ile Arg Tyr Ile Ala Asp Lys His Asn 65 70 75 80

Met Leu Gly Gly Cys Pro Lys Glu Arg Ala Glu Ile Ser Met Leu Glu 85 90 95

Gly Ala Val Leu Asp Ile Arg Tyr Gly Val Ser Arg Ile Ala Tyr Ser 100 105 110

Lys Asp Phe Glu Thr Leu Lys Val Asp Phe Leu Ser Lys Leu Pro Glu 115 120 125

Met Leu Lys Met Phe Glu Asp Arg Leu Cys His Lys Thr Tyr Leu Asn 130 140

Gly Asp His Val Thr His Pro Asp Phe Met Leu Tyr Asp Ala Leu Asp 145 150 155 160

Val Val Leu Tyr Met Asp Pro Met Cys Leu Asp Ala Phe Pro Lys Leu 165 170 175

Val Cys Phe Lys Lys Arg Ile Glu Ala Ile Pro Gln Ile Asp Lys Tyr 180 185 190

Leu Lys Ser Ser Lys Tyr Ile Ala Trp Pro Leu Gln Gly Trp Gln Ala

195 200 205

Thr Phe Gly Gly Gly Asp His Pro Pro Lys Ser Asp Leu Val Pro Arg 210 215 220 Gly Ser Pro Glu Phe Pro Gly Glu Val Leu Leu Leu Asp Ser Lys Ala 225 230 235 240 Gln Gln Thr Glu Leu Glu Trp Ile Ser Ser Pro Pro Asn Gly Trp Glu 245 250 255 Glu Ile Ser Gly Leu Asp Glu Asn Tyr Thr Pro Ile Arg Thr Tyr Gln 260 265 270 Val Cys Gln Val Met Glu Pro Asn Gln Asn Asn Trp Leu Arg Thr Asn 275 280 285 Trp Ile Ser Lys Gly Asn Ala Gln Arg Ile Phe Val Glu Leu Lys Phe 290 295 300 Thr Leu Arg Asp Cys Asn Ser Leu Pro Gly Val Leu Gly Thr Cys Lys 305 310 315 Glu Thr Phe Asn Leu Tyr Tyr Glu Thr Asp Tyr Asp Thr Gly Arg 325 330 335 Asn Ile Arg Glu Asn Leu Tyr Val Lys Ile Asp Thr Ile Ala Ala Asp 340 345 350 Glu Ser Phe Thr Gln Gly Asp Leu Gly Glu Arg Lys Met Lys Leu Asn 355 360 365 Thr Glu Val Arg Glu Ile Gly Pro Leu Ser Lys Lys Gly Phe Tyr Leu 370 380 Ala Phe Gln Asp Val Gly Ala Cys Ile Ala Leu Val Ser Val Lys Val 385 390 395 400 Tyr Tyr Lys Lys Cys Trp Ser Ile Ile Glu Leu Glu Arg Pro His Arg 405 410 415

Asp

Mouse

<210> 18 <211> 184 <212> PRT

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Met Ala Pro Ala Gln Arg Pro Leu Leu Pro Leu Leu Leu Leu Leu Leu 1 5 10 15

Pro Leu Arg Ala Arg Asn Glu Asp Pro Ala Arg Ala Asn Ala Asp Arg 20 25 30

Tyr Ala Val Tyr Trp Asn Arg Ser Asn Pro Arg Phe Gln Val Ser Ala 35 40 45

Val Gly Asp Gly Gly Tyr Thr Val Glu Val Ser Ile Asn Asp Tyr 50 60

Leu Asp Ile Tyr Cys Pro His Tyr Gly Ala Pro Leu Pro Pro Ala Glu 65 70 75 80

Arg Met Glu Arg Tyr Ile Leu Tyr Met Val Asn Gly Glu Gly His Ala 85 90 95

Ser Cys Asp His Arg Gln Arg Gly Phe Lys Arg Trp Glu Cys Asn Arg 100 105 110

Pro Ala Ala Pro Gly Gly Pro Leu Lys Phe Ser Glu Lys Phe Gln Leu 115 120 125

Phe Thr Pro Phe Ser Leu Gly Phe Glu Phe Arg Pro Gly His Glu Tyr 130 140

Tyr Tyr Ile Ser Ala Thr Pro Pro Asn Leu Val Asp Arg Pro Cys Leu 145 150 155 160

Arg Leu Lys Val Tyr Val Arg Pro Thr Asn Glu Thr Leu Tyr Glu Ala 165 170 175

Pro Glu Pro Ile Phe Thr Ser Asn

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Pro Leu Pro Pro Pro Pro Phe Ala Pro Pro Glu Asp Arg Arg Ala 20 25 30

<210> 19

<211> 188

<212> PRT

<213> Human

Asn Ser Asp Arg Tyr Ala Val Tyr Trp Asn Arg Ser Asn Pro Arg Phe 35 40 45

His Ala Gly Ala Gly Asp Asp Gly Gly Gly Tyr Thr Val Glu Val Ser 50 60

Ile Asn Asp Tyr Leu Asp Ile Tyr Cys Pro His Tyr Gly Ala Pro Leu 65 70 75 80

Pro Pro Ala Glu Arg Met Glu His Tyr Val Leu Tyr Met Val Asn Gly 85 90 95

Glu Gly His Ala Ser Cys Asp His Arg Gln Arg Gly Phe Lys Arg Trp 100 105 110

Glu Cys Asn Arg Pro Ala Ala Pro Gly Gly Pro Leu Lys Phe Ser Glu 115 120 125

Lys Phe Gln Leu Phe Thr Pro Phe Ser Leu Gly Phe Glu Phe Arg Pro 130 140

Gly His Glu Tyr Tyr Tyr Ile Ser Ala Thr Pro Pro Asn Ala Val Asp 145 150 155 160

Arg Pro Cys Leu Arg Leu Lys Val Tyr Val Arg Pro Thr Asn Glu Thr 165 170 175

Leu Tyr Glu Ala Pro Glu Pro Ile Phe Thr Ser Asn 180 185

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Met Ala Met Ala Arg Ser Arg Arg Asp Ser Val Trp Lys Tyr Cys Trp 10 15

Gly Leu Leu Met Val Leu Cys Arg Thr Ala Ile Ser Arg Ser Ile Val 20 25 30

Leu Glu Pro Ile Tyr Trp Asn Ser Ser Asn Ser Lys Phe Leu Pro Gly 35 40 45

Gln Gly Leu Val Leu Tyr Pro Gln Ile Gly Asp Lys Leu Asp Ile Ile 50 60

²⁰ 229 <210>

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<212> **PRT**

<213> Mouse

Cys Pro Lys Val Asp Ser Lys Thr Val Gly Gln Tyr Glu Tyr Tyr Lys 65 70 75 80

Val Tyr Met Val Asp Lys Asp Gln Ala Asp Arg Cys Thr Ile Lys Lys 85 90 95

Glu Asn Thr Pro Leu Leu Asn Cys Ala Arg Pro Asp Gln Asp Val Lys
100 105 110

Phe Thr Ile Lys Phe Gln Glu Phe Ser Pro Asn Leu Trp Gly Leu Glu 115 120 125

Phe Gln Lys Asn Lys Asp Tyr Tyr Ile Ile Ser Thr Ser Asn Gly Ser 130 135 140

Leu Glu Gly Leu Asp Asn Gln Glu Gly Gly Val Cys Gln Thr Arg Ala 145 150 155 160

Met Lys Ile Leu Met Lys Val Gly Gln Asp Ala Ser Ser Ala Gly Ser 165 170 175

Ala Arg Asn His Gly Pro Thr Arg Arg Pro Glu Leu Glu Ala Gly Thr 180 185 190

Asn Gly Arg Ser Ser Thr Thr Ser Pro Phe Val Lys Pro Asn Pro Gly 200 205

Ser Ser Thr Asp Gly Asn Ser Ala Gly His Ser Gly Asn Asn Leu Leu 210 215 220

Gly Ser Glu Val Ala 225

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226 <211>

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Met Val Leu Cys Arg Thr Ala Ile Ser Lys Ser Ile Val Leu Glu Pro

Ile Tyr Trp Asn Ser Ser Asn Ser Lys Phe Leu Pro Gly Gln Gly Leu 35 40 45

Val Leu Tyr Pro Gln Ile Gly Asp Lys Leu Asp Ile Ile Cys Pro Lys

Val Asp Ser Lys Thr Val Gly Gln Tyr Glu Tyr Tyr Lys Val Tyr Met 65 70 75 80

55

Val Asp Lys Asp Gln Ala Asp Arg Cys Thr Ile Lys Lys Glu Asn Thr 85 90 95

Pro Leu Leu Asn Cys Ala Lys Pro Asp Gln Asp Ile Lys Phe Thr Ile $100 \hspace{1cm} 105 \hspace{1cm} 110$

Lys Phe Gln Glu Phe Ser Pro Asn Leu Trp Gly Leu Glu Phe Gln Lys 125

Asn Lys Asp Tyr Tyr Ile Ile Ser Thr Ser Asn Gly Ser Leu Glu Gly 130 140

Leu Asp Asn Gln Glu Gly Gly Val Cys Gln Thr Arg Ala Met Lys Ile 145 150 155 160

Leu Met Lys Val Gly Gln Asp Ala Ser Ser Ala Gly Ser Thr Arg Asn 165 170 175

Lys Asp Pro Thr Arg Arg Pro Glu Leu Glu Ala Gly Thr Asn Gly Arg 180 185 190

Ser Ser Thr Thr Ser Pro Phe Val Lys Pro Asn Pro Gly Ser Ser Thr $195 \hspace{1cm} 200 \hspace{1cm} 205$

Asp Gly Asn Ser Ala Gly His Ser Gly Asn Asn Ile Leu Gly Ser Glu 210 215 220

val Ala 225

<210> 22

<211> 330

<212> PRT <213> Homo sapiens

<400> 22

Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser Ser Lys $1 \hspace{1cm} 5 \hspace{1cm} 10 \hspace{1cm} 15$

Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr 20 25 30

Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser 35 40 45

Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser 50 60 Leu Ser Ser Val Val Thr Val Pro Ser Ser Leu Gly Thr Gln Thr 65 70 75 80 Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr Lys Val Asp Lys 85 90 95 Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro Pro Cys 100 105 110Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro 115 120 125 Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys 130 140 Val Val Val Asp Val Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp 145 150 155 160 Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu 165 170 175 Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu 180 185 190 His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn 195 200 205 Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly 210 220 Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu 225 230 235 240 Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr 245 250 255 Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn 260 265 270 Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe 275 280 285 Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn 290 295 300

26

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Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr 305 310 315 320
Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
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Pro Pro Gly Pro Leu Val
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